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(56) Documents Cited

GB 2315015 A US 5697757 A US 5538214 A

US 5513579 A US 5192963 A

WPI Abstract, Acc. No. 1989-333517 & DE 3814771 A

WPI Abstract, Acc. No. 1998-143374 & NL 1003491 C

(58) Field of Search

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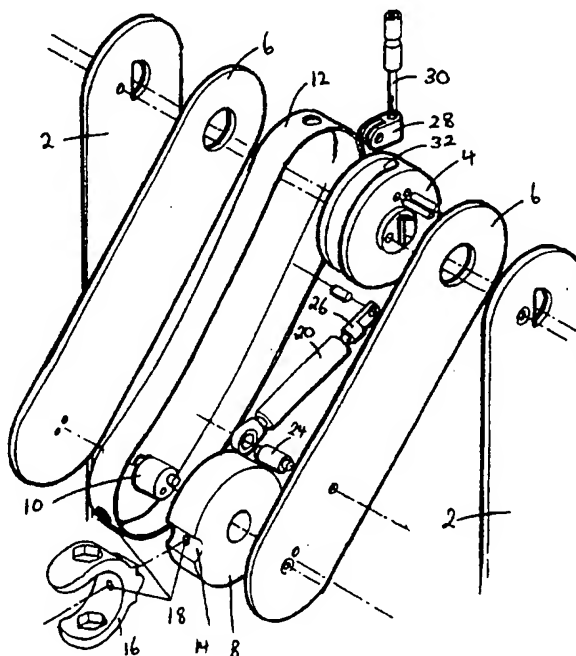
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(54) Abstract Title

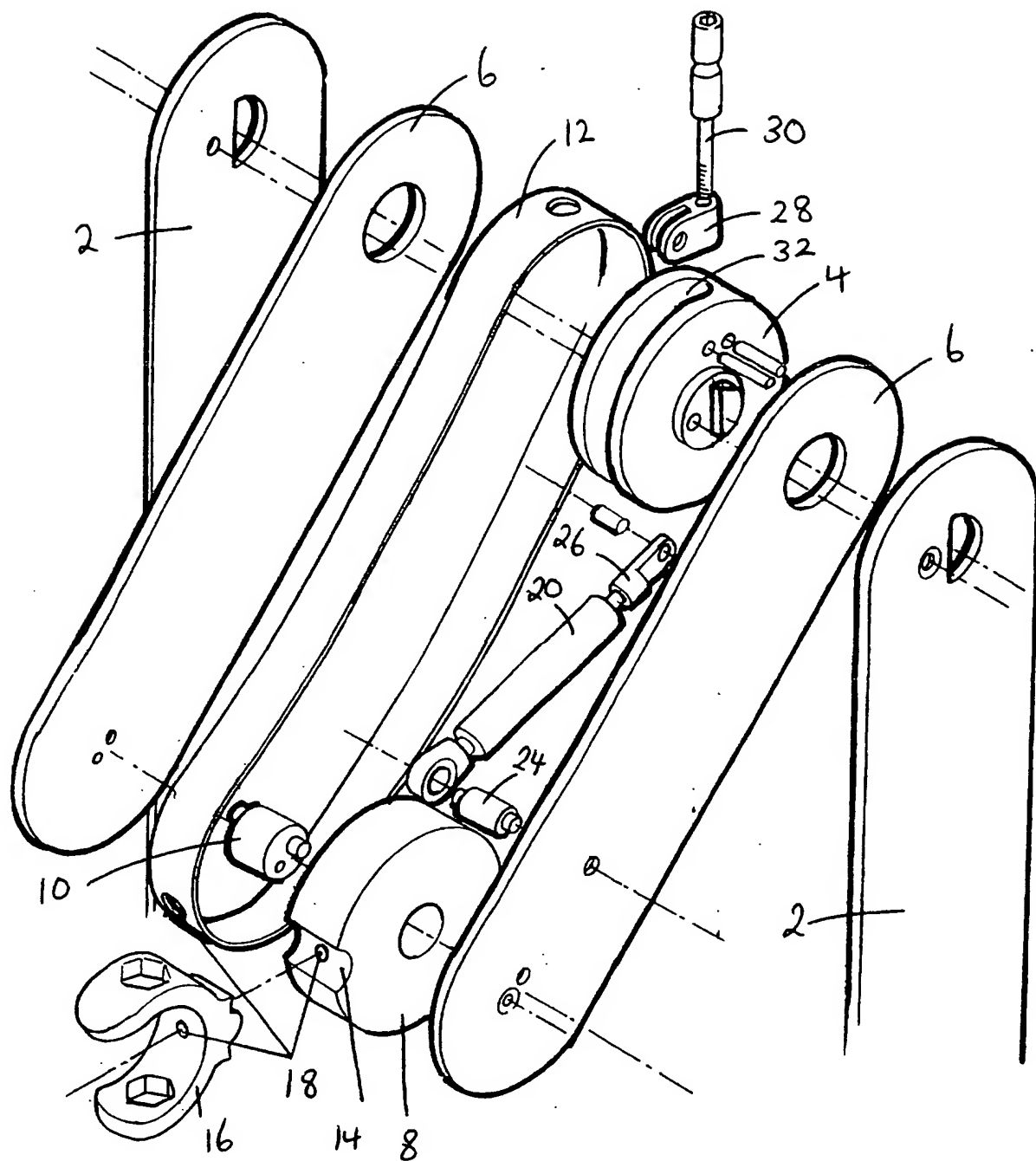
**An adjustable support for an apparatus**

(57) An adjustable support for an apparatus such as a display screen comprises a shoulder portion, an arm portion and a hand portion; wherein the shoulder portion comprises a first drum element 4 which is fixedly mounted; wherein the arm portion comprises: a housing 6 which is pivotally mounted on the shoulder portion; a second drum element 8 which is rotationally mounted within the housing; and a belt element 12 which passes over the first and second drum elements and is adapted to prevent free rotation of the second drum element; and wherein the hand portion 16 is adapted to hold an apparatus and is fixedly mounted on the belt element.



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## AN ADJUSTABLE SUPPORT FOR AN APPARATUS

### Field of the Invention

The present invention relates to an adjustable support for supporting an apparatus such as a display screen or a keyboard shelf.

### 5 Background Art

Display screens such as television and computer screens are generally supported from a wall or above a horizontal surface at a height which is relatively comfortable for a person viewing the screen. For example, traditional computer screens are often supported above a desk by placing the  
10 screen on the hard-drive of a computer which sits on the desk. Also, a television screen may be supported on a shelf or by using a floor stand.

However, there is increasing concern that such fixed forms of support do not allow viewers to adjust easily the position of display screens to achieve optimum viewing conditions, particularly with respect to posture and comfort.  
15 This is a concern especially for visual display unit operators who spend most of their working day viewing display screens. There is therefore a need for adjustable supports for display screens, particularly as traditional cathode ray tube screens are replaced by flat display screens. There is also a need for adjustable supports for apparatus such as computer keyboards.

20 The present invention seeks to provide an improved adjustable support for an apparatus such as a display screen or a keyboard shelf, which support permits easy and stable repositioning of the apparatus.

It also seeks to provide an adjustable support which is adapted to control and maintain the orientation of a supported apparatus whilst the position of the  
25 apparatus is adjusted.

The present invention additionally seeks to provide an adjustable support which reduces the amount of applied force required to adjust the

position of an apparatus supported thereby.

### Summary of the Invention

According to the present invention there is provided an adjustable support for an apparatus comprising a shoulder portion, an arm portion and a  
5 hand portion;

wherein the shoulder portion comprises a first drum element which is fixedly mounted;

wherein the arm portion comprises:

a housing which is pivotally mounted on the shoulder portion;

10 a second drum element which is rotationally mounted within the housing; and  
a belt element which passes over the first and second drum elements and is adapted to prevent free rotation of the second drum element; and  
wherein the hand portion is adapted to hold an apparatus and is fixedly mounted on the belt element.

15 The apparatus is preferably a display screen, such as a computer or television flat display screen. It may also be a shelf for a computer keyboard, which shelf is sufficiently strong to support both the keyboard and the weight of an operator's hands. Other items of apparatus used in the office, factory, laboratory or home, for example, may also be supported by the adjustable  
20 support of the present invention.

In operation, a viewer applies a force to an apparatus, such as a display screen, mounted on the hand portion of the support. This force causes the arm portion to pivot about the shoulder portion, the second drum element to rotate about its axis under the control of the belt, and the hand portion to move the  
25 apparatus along a predetermined path. This path is predetermined by the dimensions of the pulley system comprising the first and second drum elements and the belt element. In a preferred embodiment, the path causes the

vertical positioning of the apparatus to be adjusted relative to a horizontal desk top, for example.

The pulley system preferably acts to maintain and control the orientation of a supported apparatus while the apparatus is being repositioned.

5        Preferably, the first and second drum elements each present an arc-shaped surface to the belt. For example, the drum elements are substantially cylindrical or semi-cylindrical (ie D - shaped), such that the surface presented to the belt is semi-circular in shape. When each drum element presents an arc-shaped surface which is substantially equal in shape and size to that of the  
10 other drum element, the support constrains the display screen to substantially parallel motion. Alternatively, the drum elements may be non-arc-shaped and/or have a different size, in which case the support constrains the display screen to a motion which is non-parallel. For example, each drum element may present a surface to the belt that is semi-elliptical in shape.

15        Preferably, the first drum element presents a surface to the belt that is substantially the same size and shape as the surface presented to the belt by the second drum element. The first and second drum elements preferably have the same or substantially the same overall size and shape, particularly in terms of circumferential profile and diameter.

20        The belt element is usefully a length of a strong and substantially non-extendible material such as rubber, metal or fabric. The belt element may be a belt, a wire, a cable, a chain or a strap. It may be endless or it may be attached to the first drum element. The belt is preferably adapted to prevent free rotation of the second drum element as a result of friction therebetween.  
25 Alternatively, or in addition, the belt may be fixed to the second drum element.

The first drum element is preferably fixedly mounted on the shoulder portion.

The second drum element is preferably rotationally mounted on the housing.

In a preferred embodiment of the present invention, the support further comprises a means adapted to counter-balance the weight of a supported  
5 apparatus. This counter-balancing means is preferably adjustable to counter-balance apparatus of different weights.

The counter-balancing means may be mounted between the shoulder portion and the arm portion. It may be mounted on the shoulder portion at a point adjacent to the pivot point of the housing. In use, the counter-balancing  
10 means may be adjustable to vary the distance between the mounting point of the counter-balancing means on the shoulder portion and the pivot point of the housing; this enables the support to provide a neutral counter-balancing force for apparatus of different weights. The adjustability of the counter-balancing means may be provided by a screw, a cam, a linkage or a disc defining a  
15 helical path for a pin.

The counter-balancing means preferably comprises a member which stores potential energy such as a spring; for example, a gas strut spring, a helical spring, a wound constant force spring or a leaf spring.

The counter-balancing means preferably acts to minimise the applied  
20 force necessary to adjust the position of a supported apparatus.

The hand portion may be fixedly mounted on the second drum element. It may be adapted to provide movement of a supported apparatus in three-dimensions.

The hand portion preferably comprises a friction joint. This joint may  
25 allow limited rotational movement of a supported apparatus in three-dimensions..

In a preferred embodiment of the present invention, the support further

comprises a base element to which the shoulder portion is connectable. This base element may be attachable to a desk or a wall using a clamp or a bracket, for example. The base element may be mounted for rotational movement with respect to a supporting surface (eg. a desk or a wall).

5 In use, a plurality of the supports of the present invention may be connected in series to allow greater freedom of movement of a supported apparatus, while controlling the movement of the hand portion along a predetermined path and while maintaining the counter-balancing effect of a spring, for example.

#### 10 Detailed Description of the Invention

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawing, which is an exploded view of an adjustable support.

An adjustable support for a display screen has two shoulder plates 2  
15 between which are fixedly mounted a first drum 4. A housing plate 6 is pivotally mounted between each shoulder plate and the first drum.

Between the ends of the housing plates remote from the first drum is a second drum 8. This drum is rotatably mounted on an axle 10 which is mounted between the housing plates. A belt 12 passes over the two drums:  
20 friction between the belt and the drums keeps the belt in position and prevents free rotation of the second drum 8. Hence, the rotational movement of the second drum is controlled by the belt. This pulley system of the belt and drums is adapted to control and maintain the angle of a supported display screen relative to a desk top, for example, whilst the position of the screen is  
25 adjusted.

The second drum 8 has an indentation 14 which is shaped to receive a friction joint 16. This friction joint is fixedly mounted on the second drum by

means of a pin (not shown) which passes through holes 18 in the friction joint, the belt and the second drum. The belt is thereby fixed to the second drum.

The friction joint allows limited rotation of a supported display screen about three axes.

5 One end of a gas strut spring 20 is connected to the housing plates using a pin 24. The other end 26 of the spring 20 is connected to an adjustment block 28. This block is mounted on a screw 30 and is located within a cavity 32 provided in the first drum 4. This locates end 26 of the spring below the point about which the housing plates are pivotally mounted on the shoulder  
10 plates. By manually adjusting screw 30, the adjustment block moves along the thread of the screw, thereby varying the distance between the location of end 26 of the spring and the pivot point. This adjustability of this distance enables this spring mechanism to provide a neutral counter-balancing force for display screens of different weights.

15 The shoulder plates 2 are fixed to a base plate (not shown). The base plate is mounted on a desk and is adapted to rotate relative to the horizontal desk top about a vertical axis. Alternatively, the shoulder plates are fixed to a surface such as a wall, shelf or purpose-made bracket.

To operate the support, a viewer manually applies force to a supported  
20 screen in the vertical direction he wishes the screen to move. Since belt 12 fixes second drum 8 against free rotation, this force causes the housing plates to pivot about the shoulder plates. These shoulder plates and the first drum remain stationary. The pivotal movement of the housing plates relative to the first drum causes the belt to drive the second drum about its rotational axis.  
25 The second drum thereby moves the friction joint and the display screen along a predetermined path.



### Claims

1. An adjustable support for an apparatus comprising a shoulder portion,  
an arm portion and a hand portion;
- 5 wherein the shoulder portion comprises a first drum element which is fixedly  
mounted;
- wherein the arm portion comprises:
- a housing which is pivotally mounted on the shoulder portion;
- a second drum element which is rotationally mounted within the housing; and
- 10 a belt element which passes over the first and second drum elements and is  
adapted to prevent free rotation of the second drum element; and
- wherein the hand portion is adapted to hold an apparatus and is fixedly  
mounted on the belt element.
2. A support as claimed in claim 1, further comprising a means adapted to
- 15 counter-balance the weight of a supported apparatus.
3. A support as claimed in claim 2, wherein the counter-balancing means  
is adjustable to counter-balance apparatus of different weights.
4. A support as claimed in claim 2 or claim 3, wherein the counter-  
balancing means is mounted between the shoulder portion and the arm portion.
- 20 5. A support as claimed in any one of claims 2 to 4, wherein the counter-  
balancing means comprises a spring.
6. A support as claimed in any preceding claim, wherein the first and  
second drum elements each present an arc-shaped surface to the belt.
7. A support as claimed in any preceding claim, wherein the first drum
- 25 element presents a surface to the belt that is substantially the same size and  
shape as the surface presented to the belt by the second drum element.
8. A support as claimed in any preceding claim, wherein the hand portion

comprises a friction joint.

9. A support as claimed in any preceding claim, wherein the hand portion is adapted to provide movement of a supported apparatus in three-dimensions.

10. A support as claimed in any preceding claim, further comprising a base  
5 element to which the shoulder portion is connectable.

11. An adjustable support substantially as hereinbefore described with reference to the accompanying drawing.



Application No: GB 9901811.1  
Claims searched: all

Examiner: Richard Gregson  
Date of search: 26 November 1999

**Patents Act 1977**  
**Amended Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): A4B; A4L LBPA, LBPB, LBPG, LBPL

Int Cl (Ed.6): F16M 11/00, 11/04, 11/06, 11/08, 11/10, 11/12, 13/00; A47B 21/03

Other: Online: EPODOC, WPI, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2315015 A (McINTOSH) - see diagrams in particular	1,2,4,5,6,7, 10.
X	US 5513579 A (ALLAN) - see diagrams in particular	1,2,4,5,6,7, 10.
X	US 5192963 A (HILL) - Whole document.	1,2,10
X	US 5538214 A (SINILA - Whole document	1
X	US 5697757 A (LINDSAY) - Whole document	1,2,3,10
X	WPI Abstract. Acc. No.1989-333517 & DE 3814771 A. (BODLER) - see diagram in particular	1
X	WPI Abstract. Acc No.1998-143374 & NL1003491 C (KOK)	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



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**Search Report under Section 17**

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X	US 5192963 A (HILL) - Whole document.	1,2,10
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X	US 5697757 A (LINDSAY) - Whole document	1,2,3,10
X	WPI Abstract. Acc. No.1989-333517 & DE 3814771 A. (BODLER) - see diagram in particular	1
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Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.